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Unlocking the Socioeconomic Advantages of *Cannabis Sativa* L. Legalization in African Countries: An In-Depth Review

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ABSTRACT: *Cannabis sativa L., an annual, dioecious, short-day plant from the Cannabaceae family, presents versatile applications encompassing cannabinoids and terpenes for medicinal or recreational utilization, as well as oil production for culinary, cosmetic, and animal feed purposes. Additionally, the plant's resilient fiber can be processed as paper, biodegradable plastics, textiles, and as construction materials (i.e., hempcrete). On a global scale, the cannabis market is projected to attain a value of $272 billion by 2028. Despite its considerable potential, some countries, including African nations, uphold prohibition due to entrenched stigma, curtailing Africa's potential involvement in the cannabis industry. Unlike regions such as the United States and Europe, where outdoor cannabis cultivation occurs once annually, Africa's climatic conditions and fertile soils allow for up to three growth cycles each year, positioning the continent as a potential frontrunner in global cannabis production. This prospect holds the potential to significantly enhance Africa's socioeconomic development by fostering job creation, addressing youth unemployment, increasing its GPD, and spurring infrastructure development. However, these inherent advantages remain underutilized due to an enduring lack of cannabis education programs that can counteract social stigma. We recommend African countries to contemplate emulating the 2018 US Farm Bill, which allows the cultivation of cannabis cultivars with diminished levels of Δ9-THC (up to 0.3%), commonly known as hemp. Hemp possesses diverse applications, encompassing medicinal uses involving CBD, THCV, CBG and other non-psychotropic cannabinoids, alongside fiber, feed, and oil production. This strategic step could yield substantial job prospects and entrepreneurial ventures, potentially generating an annual revenue surpassing $7.0 billion from cannabis and hemp flower sales exclusively.*

KEYWORDS: *Cannabis sativa* L., cannabinoids, terpenes, feed, fiber, oil production, 2018 US Farm Bill, African nations, and socioeconomic development.

INTRODUCTION

Cannabis sativa L. is an annual, dioecious, and short-day plant within the Cannabaceae family, encompassing diverse applications such as drugs, medicine, feed, fiber, and oil production

(Chandra et al., 2017). The 2018 US Farm Bill classifies the *Cannabis sativa* crop into two distinct categories: Marijuana and Industrial hemp. Specifically, Marijuana denotes any *Cannabis sativa* cultivar with a Δ9-THC (delta-9 tetrahydrocannabinol) psychotropic compound content exceeding 0.3% (U.S. Congress, 2018). In contrast, hemp encompasses cultivars containing Δ9-THC levels up to 0.3%, as per the same legislation. This demarcation underscores marijuana's primary use for recreational purposes due to its elevated Δ9-THC concentration. Conversely, hemp cultivars, containing up to 0.3% of total THC, serve as sources of non-psychotropic compounds like CBD (cannabidiol) and CBG (Cannabigerol) (Monthony et al., 2021). Despite disparities in compound availability, it is imperative to acknowledge that, botanically, hemp and marijuana are indeed the same plant (Monthony et al., 2021).

In recent years, a considerable focus has turned toward uncovering the medicinal attributes of Cannabis. This attention stems from the array of health advantages offered by its phytochemical constituents—cannabinoids, terpenes, flavonoids, and alkaloids, most of which exhibit the potential to enhance human well-being (Lata et al., 2015; Gulluni et al., 2018; Cox-Georgian et al., 2019). These secondary plant metabolites, synthesized during the plant's growth, fulfill a range of roles, including pest defense and attraction of pollinators (Sommano, 2020). While the synthesis of cannabinoids and terpenes occurs throughout the plant, their concentration is notably elevated in trichomes—extracellular structures primarily found on the female flowers of Cannabis (Small and Cronquist, 1976; Lubell and Brand, 2018).

Cannabinoids, including Cannabidiol (CBD), delta-9-tetrahydrocannabinol (Δ9-THC), cannabigerol (CBG), tetrahydrocannabivarin (THCV), cannabichromene (CBC), and cannabinol (CBN), have undergone extensive examination for their medicinal properties. For instance, CBD has demonstrated efficacy in managing Lennox-Gastaut Syndrome (LGS) in both pediatric and adult epilepsy patients (Koo et al., 2020). Notably, it exhibits potential in suppressing the expression of Id-1 in metastatic breast cancer cells (McAllister et al., 2011), safeguarding against brain damage, enhancing neuron and astrocyte protection (Lafuente et al., 2011), regulating inflammatory responses in asthma (Vuolo et al., 2015), and potentially benefiting Alzheimer's disease management (Martin-Moreno et al., 2011). Moreover, CBD inhalants have exhibited inhibitory effects on lung cancer growth by downregulating CD44 and impeding angiogenesis in nude mice (Salles et al., 2023).

In contrast, THC, the intoxicating constituent of Cannabis, is sought after for recreational purposes. Meanwhile, CBG has been found to possess antifungal, antibacterial, and anti-inflammatory properties (Robaina-Cabrera et al., 2021). Similarly, CBC demonstrates anti-inflammatory and anti-nociceptive attributes (Udoh et al., 2018), while CBN functions as an analgesic, alleviates myofascial pain disorders, enhances drowsiness, and displays antibacterial efficacy (Maioli et al., 2022). Lastly, THCV exhibits promise as an appetite suppressant and energy metabolism regulator, positioning it as a potential candidate for addressing obesity-related concerns (Abioye et al., 2020).

Much like cannabinoids, the terpenes discovered in *Cannabis sativa* L., such as ß-myrcene, D-limonene, α-pinene, and ß-caryophyllene, also contribute to enhancing human health. For example, ß-myrcene has exhibited both antifungal and antibacterial activities (Cox-Georgian et al., 2019), while D-limonene finds clinical application in mitigating heartburn by neutralizing gastric acid and has been explored for potential preventive effects against breast cancer (Sun, 2007). Additionally, α-pinene displays promise in reversing THC intoxication and aiding memory recovery through acetylcholinesterase inhibition (Nissen et al., 2010), while ß-caryophyllene's anti-inflammatory properties have been established (Gertsch et al., 2008).

Beyond its medicinal applications, *Cannabis sativa* L. has been subject to investigation as a potential feed ingredient for animals due to its nutritional composition and associated health benefits. Notably, hemp seeds stand out for their exceptional nutritional profile, encapsulating a valuable amalgamation of vital constituents. Typically, these seeds boast over 30% oil content and approximately 25% protein, alongside substantial quantities of dietary fiber, vitamins, and minerals (Taubner et al., 2023). Within the spectrum of components, the oil content in hemp seeds varies from 26.6% to 37.8%, thereby constituting the predominant element (Farinon et al., 2020). Of special mention is hemp seed oil, comprising more than 80% polyunsaturated fatty acids, with an advantageous omega-6 to omega-3 ratio of approximately 3:1 (Jurgoński et al., 2020).

Studies underscore the nutritional worth of hemp seed meal for animals. For instance, the research conducted by Mourot and Guillevic (2015) revealed that integrating hempseed oil into pig diets not only improved protein digestibility but also enhanced the alpha-linolenic acid (ALA) content, thereby augmenting the nutritional quality of pork. Similarly, findings from Taubner et al. (2017) investigation demonstrated the efficacy of combining hempseed with Flaxseed in feeding broiler chickens, as substantiated by their muscular growth.

Cannabis-derived fiber presents a multitude of applications attributed to its notable attributes of strength, durability, and environmental sustainability. These applications span a range of fields including construction materials, paper production, and the development of biodegradable plastics. Of specific note, hemp fiber possesses the capacity to yield fabrics, ropes, and twines esteemed for their resilience and breathability (Newman et al., 2022).

In the realm of construction, hemp fiber proves invaluable in the creation of hempcrete—an ecologically conscious and lightweight construction material boasting exceptional insulation properties (Bedlivá and Isaacs, 2014). Furthermore, the utilization of hemp-based composites exhibits promise in the fabrication of biodegradable plastics, thus mitigating reliance on petroleum-based plastics and their associated ecological ramifications (Modi et al., 2018).

Historically, hemp paper has enjoyed utilization due to its strength and prolonged durability. By employing fiber sourced from hemp plants, a sustainable alternative to conventional wood-based pulp emerges, as hemp's expedited cultivation and harvest cycles effectively reduce the ecological footprint inherent to conventional materials (Tutus et al., 2016).

Furthermore, cannabis-derived oil presents a diverse array of applications and advantages. Abundant in essential fatty acids, antioxidants, and other bioactive compounds, this oil has become a prized ingredient across various industries. A foremost application of hemp oil resides within the culinary realm, where it finds utilization as both a cooking medium and a nutritious constituent in dressings, sauces, and baked goods. Notably, hemp oil's nutty flavor and its commendable ratio of omega-3 to omega-6 fatty acids contribute to cardiovascular health promotion (Rodriguez-Leyva et al., 2010). Moreover, hemp-derived oil stands as a notable source of plant-based protein, rendering it an apt choice for adherents of vegetarian and vegan diets.

Beyond its culinary utilization, the cosmetic and personal care sector extensively leverages hemp oil. Its emollient and nutritive attributes render it a favored inclusion in skincare products like lotions, creams, and balms (Callaway et al., 2005). Acknowledged for its capacity to mollify and hydrate the skin, hemp oil proves particularly advantageous in addressing dry and sensitive skin conditions.

Undeniably, *Cannabis sativa* stands as a versatile crop endowed with multifaceted utility. The full-scale legalization of its cultivation for expanded production and consumption possesses the potential to stimulate job creation and invigorate national economies. Exemplifying this, the United States' hemp CBD market has witnessed exponential growth, exceeding $4.5 billion in 2021 and predicted to surpass $16.0 billion by 2025 (Brightfield Group, 2021). Amid such projections, it becomes evident that *Cannabis sativa* L. could serve as a lucrative cash crop and a catalyst for job opportunities. Curiously, despite these prospects, certain countries, including numerous African nations, persist in upholding its prohibition. This stands in stark contrast to the potential profitability and societal benefits that cannabis could yield in these regions, particularly considering the favorable climatic conditions conducive to its cultivation.

The process of legalizing cannabis in Africa is not devoid of challenges. This undertaking encounters significant hurdles and obstacles, among which prominent issues encompass social stigma and entrenched cultural barriers. Cannabis, due to its historical association with recreational drug use, has suffered from prolonged stigmatization in these regions. Overcoming these deep-seated societal and cultural biases constitutes a formidable task, as numerous individuals still perceive cannabis primarily as a detrimental substance. This perception obscures the recognition of its potential medical and economic advantages. This distortion often results from a lack of awareness and education, where misinformation acts as a hindrance to the legalization process.

Effectively addressing these challenges mandates a comprehensive and evidence-driven strategy. This strategy should entail the active involvement of stakeholders, public consultation, educational initiatives, and meticulously formulated policies and regulations. Nations aspiring to legalize cannabis must meticulously evaluate their unique circumstances and tailor their approaches to effectively surmount these barriers.

Notably, Africa, often referred to as the cradle of civilization, hosts several undiscovered cannabis landraces. While the African climate is conducive to cultivating diverse cannabis strains, the region has faced substantial setbacks in legalizing cannabis for both medicinal and recreational purposes. Despite this challenge, cannabis remains the most widely consumed illegal substance in Africa, its use interwoven with historical, political, social, economic, and medicinal dimensions. Notably, delving into the history of hemp/marijuana invariably invokes the mention of Africa (Kitchen et al., 2022).

Indigenous cannabis usage in Africa traces its origins back to 1500 BC, as evidenced by the mention of topical cannabis application for inflammation within the Ebers Papyrus in Egypt (Crocq, 2020). Subsequently, cannabis gained traction in cultural and medicinal practices, notably in 14th-century Ethiopia (Adu-Gyamfi et al., 2015). Remarkably, various applications emerged, including its utilization for anesthesia by Sierra Leonean midwives, as a helminthic protectant by Congo's Aka forest-forager group, and as a wound healing agent by South African healers and warriors (Kitchen et al., 2022). Despite the illegal status of cannabis in most African regions, its continued use endures for recreational, religious, commercial, and medicinal purposes. Particularly for economically or ecologically challenged agricultural environments, cannabis serves as a cash crop, with much of the production flowing into the black or illegal market for export and domestic consumption (Duvall, 2019).

Addressing youth unemployment within Africa remains a pressing concern, with profound social, economic, and political implications. Comprehensive action demands concerted efforts from governments, the private sector, civil society organizations, and educational institutions (Abisoye, 2021; Jenkins et al., 2011). The potential of Africa's youth population can be harnessed to foster inclusive growth and sustainable development by confronting the root causes of unemployment and executing targeted policies and programs. The United Nations defines youth as individuals aged 15 to 24, and a striking 80% of this cohort resides within developing countries, constituting half of their population (UNDESA, 2021). The foreseeable trajectory indicates that nearly every individual under 25 years of age will dwell in a developing nation by 2050. Moreover, projections anticipate that 86% of the world's impoverished individuals will be concentrated in the rural areas of the Sub-Saharan region, with a concurrent 50% increase in young people living within this region (UNDESA, 2021). While Africa's youthful demographic is substantial, existing policies often fail to acknowledge this reality. A dearth of awareness regarding the priorities of most of the youth population characterizes both national governments and the supporting organizations (UNDESA, 2021; Uwakonye, 2020).

Elevating this discourse, the legalization of cannabis for medicinal, recreational, and industrial applications within African nations emerges as a potential avenue for mitigating youth unemployment. Such a move could exert a positive socio-economic influence by fostering fresh business ventures and job opportunities. For instance, the model set by the 2018 US Farm Bill could be emulated, where cannabis cultivars containing up to 0.3% of Δ9-THC are cultivated for non-psychotropic compounds, fiber, feed, and oil production (U.S. Congress, 2018). Thus, this

review and thorough discussion seek to explore the legal landscape of cannabis within Africa and evaluate its socio-economic ramifications if comprehensively legalized. This endeavor has the potential to create substantial job prospects, offering a particularly promising avenue for the African youth population.

Africa's climate potential for cannabis cultivation

The climatic conditions across Africa offer an ideal environment for both the cultivation and processing of cannabis. The continent benefits from a combination of factors such as ample rainfall, sunlight exposure, elevated temperatures, and appropriate relative humidity levels, all conducive to the thriving growth of numerous cannabis strains (UNODC, 2022). Situated entirely within 35 degrees of the equator, Africa enjoys a balance in day lengths, preventing extreme variations in sunlight and darkness. This feature ensures optimal exposure for the cannabis plant. Flourishing within temperatures ranging from 14 to 27 degrees Celsius, cannabis can even tolerate brief freezing spells (Visković et al., 2023). This favorable climate facilitates the abundant yield of cannabis plants, resins, and flowers.

Estimating the cannabis biomass yield per hectare remains challenging due to the variance in cultivation practices across Africa. While certain fields receive meticulous care and attention, others operate as low-value investments where minimal effort is exerted, and plants are left unattended for months after seed planting. In such low-investment scenarios, cannabis plants can attain considerable heights in sparsely populated fields, reaching up to four or five meters. Conversely, denser plantings lead to shorter plants. Such decisions influence the number of plants per hectare and the average herb yield per plant (UNODC, 2022).

Unlike regions such as the United States and Europe, where the cannabis outdoor production cycle is typically confined to a single annual period (from May to September) due to harsh winters, several parts of Africa boast favorable climates for year-round outdoor cannabis cultivation. Countries situated near the equator or within tropical zones, like Ethiopia, Ghana, Kenya, Nigeria, Mozambique, etc., benefit from consistent sunlight and warm temperatures throughout the year, rendering them optimal for outdoor cannabis farming. Similarly, certain countries, primarily those in the northern and southern fringes of the continent (Morocco, South Africa, Tunisia), experience Mediterranean or subtropical climates characterized by mild winters and warm summers, thereby facilitating extended outdoor growing seasons. Additionally, regions with rainforest and humid tropical climates, such as Cameroon, Democratic Republic of Congo, and Ivory Coast, receive abundant rainfall and maintain high humidity levels throughout the year. While these conditions lend themselves to outdoor cannabis cultivation, prudent strain selection is essential to prevent issues like mold formation due to excessive moisture (UNODC, 2006).

Cannabis plants exhibit high nutritional demands, with Moroccan cannabis farms, under careful management, achieving yields of up to 1.8 tons per hectare (UNODC, 2006). However, such yields may vary across other African countries, contingent upon factors such as strain choice, soil composition, nutrient availability, and other determinants. Notably, cannabis is a nitrogen-

intensive plant, with nitrogen requirements escalating before and during flowering. The plant thrives when exposed to direct sunlight, particularly during its initial six-week growth phase. In Africa, cannabis is cultivated either as a standalone crop or in conjunction with other plants, often employed to evade government detection while maximizing farmers' returns. The fertile African soil supports up to three growth cycles of cannabis annually (UNODC, 2022). Overall, cannabis assumes a significant agricultural role in Africa, as the continent offers the requisite landmass and climatic conditions conducive to its successful cultivation. These advantageous attributes position African cannabis cultivators to fulfill both local and global demands (Kitchen et al., 2022).

Cannabis legalization landscape in Africa

The utilization of cannabis in Africa has undergone an intricate transformation interwoven with the region's diverse cultures and religious beliefs. Historically, the plant enjoyed widespread acceptance prior to the advent of colonial rule. However, this narrative shifted as many African colonies enacted the prohibition of cannabis at the 1925 Geneva Convention on Opium and Other Drugs (Laudati, 2016). Subsequently, sovereign nations inherited these colonial-era restrictions, often due to international agreements and the influence of ruling elites. In the wake of such developments, the pathway toward cannabis legalization encountered significant hurdles, only recently witnessing gradual advancements, as exemplified in Table 1. The progression toward cannabis legalization exhibits notable variations from one African nation to another (Table 1).

This divergence encompasses both the process and prerequisites for legalization. In most instances, the journey involves the arduous creation of legislation by elected parliament members, followed by multiple readings and amendments of the proposed bill before it achieves legal enactment.

Table 1. The Status of Cannabis Legalization in Africa

Country	Legal status		Legalization attempts	Notes on cannabis laws
	Recreational	Medicinal		
Algeria	Illegal	Illegal	None	Algeria makes no distinction between CBD and THC. Cannabis is the most widely available drug in Algeria, and it is estimated that 302,000 people consume psychoactive substances like cannabis, with the majority aged 20 and 39 years (Abdennouri, 2014).
Angola	Illegal	Illegal	None	Angola does not have a recognized cannabis industry. Cannabis use is illegal and punishable by law(Kitchen et al., 2022)

Benin	Illegal	Illegal	None	Cannabis from the Benin Republic may lack THC (Alagbonsi *et al.*, 2019).
Botswana	Illegal	Illegal	None	The cannabis law in Botswana is quite vague, as cultivation, possession, and use are considered illegal. However, a cannabis cultivation license was issued to a company in 2018 (Ndebele, 2022).
Burkina Faso	Illegal	Illegal	None	No clear information on the status of cannabis in Burkina Faso.
Burundi	Illegal	Illegal	None	Burundi does not differentiate between CBD and THC and THC hemp.
Cameroon	Illegal	Illegal	There is a legalization movement led by Dzeka Edwin Fon, an undergraduate student. However, the country is yet to investigate it.	Cameroon was reported to have imported cannabis from Canada for HIV, Aids, and cancer patients for pain relief in 2001 (Songwe, 2001). The country also registered a request to the UN in 2002 for the export of medical cannabis (United Nations, 2003)
Cape Verde	Illegal	Illegal	None	Cannabis laws are not enforced.
Central African Republic	Illegal	Illegal	None	Use is common among youths even with stringent rules penalizing offenders(Roulette *et al.*, 2016)
Chad	Illegal	Illegal	None	No clear information on the state of cannabis in Chad.
Comoros	Illegal	Illegal	none	Cannabis was initially legal in Comoros between 1975- 1978; it later became illegal in 2019 (French, 1997).
Congo (Brazzaville)	Illegal	legal	Legalized in 2019	Cannabis was legalized for industrial, medicinal, and pharmaceutical use (Kitchen et al., 2022).
Congo (Kinshasa)	Illegal	Illegal	None	No clear information on the state of cannabis in Congo Kinshasa

Cote d'Ivoire (Ivory Coast)	Illegal	Illegal	None	No clear information on the state of cannabis in Ivory Coast.
Djibouti	Illegal	Illegal	None	Djibouti has served as a point of trafficking for cannabis and cannabis-based products.
Egypt	Illegal	Illegal	The government has shown little interest in relaxing drug laws, and cannabis reform in Egypt remains a contentious issue.	Cannabis is generally illegal, with no distinction between medical and recreational cannabis plants.
Equatorial Guinea	Illegal	Illegal	None	Cannabis was once used by the country's president from 1968–1979 for mental disorders (Raimondi, 2019).
Eritrea	Illegal	Illegal	None	Eritrea once had an active hemp industry in the early 20th century (Bjr, 2015).
Eswatini (formerly Swaziland)	Illegal	illegal	A group of members of parliament claimed cannabis legalization could add US$1.63 billion to Swaziland's GDP in 2017.	It is home to the prestigious Swazi gold strain.
Ethiopia	Illegal	Illegal	None	It is home to the Ethiopian Highland strain.
Gabon	Illegal	Illegal	None	No clear information on the state of cannabis in Gabon.
Gambia	Illegal	Illegal	None	Gambia has a good climate that allows up to three times the harvest of cannabis in a year.

Ghana	Illegal	Legal (not more than 0.3% THC)	Hemp was legalized in 2020.	The parliament is considering reversing its law on legalizing hemp for medicinal and industrial purposes.
Guinea	Illegal	Illegal	None	No clear law on the regulation of cannabis in Guinea.
Guinea-Bissau	Illegal	Illegal	None	No clear law on the regulation of cannabis in Guinea.
Kenya	Illegal	Illegal	A Lawmaker pushed for the legalization of cannabis in 2018; however, the bill's status is unknown (Jaeger, 2018).	There are no clear improvements in the moves to legalize cannabis in Kenya.
Lesotho	Illegal	legal	Legalized cannabis cultivation in 2017.	Lesotho was the first African country to grant a license for cultivation for medical purposes in 2017.
Liberia	Illegal	Illegal	None	Liberia's law reform in 2014 led the government to focus on criminalizing all forms of cannabis use, including small amounts for personal consumption (Arnold, 2013).
Libya	Illegal	Illegal	None	No clear information on the Libyan cannabis industry.
Madagascar	Illegal	Illegal	None	No clear information on the Madagascan cannabis industry
Malawi	Illegal	Legal	The country legalized the cultivation use and possession of cannabis for medical use in 2020 but did not decriminalize the plant for	Malawi is home to the famous Malawi Gold strain.

			recreational use.	
Mali	Illegal	Illegal	None	No clear information on the state of cannabis in Mali
Mauritania	Illegal	Illegal	None	No clear information on the state of cannabis in Mauritania
Mauritius	Illegal	legal	Legalized in 2022	The law requires that only those authorized by the Ministry of Health and Wellness can use cannabis for medical purposes (Cadet, 2023).
Morocco	Illegal	Legal	Morocco adopted the law to legalize cannabis in 2021.	The import and export of cannabis seeds and plants are subject to an authorization issued by the National Agency for the Regulation of Cannabis-related Activities (ANRAC) (Kasraoui, 2023).
Mozambique	Illegal	Illegal	None	There is no distinction between hemp and marijuana or CBD and THC.
Namibia	Illegal	Illegal	A petition was sent to the parliament to legalize cannabis in 2019. However, it was declined because Namibia lacks the resources to legalize cannabis (Namibian, 2019).	Cannabis is yet to be legalized for recreational and or medical use. However, this does not stop Namibians' illegal use of the plant.
Niger	Illegal	Illegal	None	No clear information on cannabis legalization in Niger
Nigeria	Illegal	illegal	**A bill to amend the National Drug Law Enforcement Agency (**NDL	Nigeria holds one of the largest cannabis markets in Africa. It has the highest number of marijuana users in Africa.

			EA) Act and legalize cannabis was stepped down in 2022 (Majeed, 2023).	
Rwanda	Illegal	Legal	Legalized in 2021	Rwanda passed an order making cannabis for medicinal purposes legal in 2021 (Iliza, 2021)
Sao Tome and Principe	Illegal	Illegal	None	No clear information on the state of cannabis legalization attempts in Sao Tome and Principe
Senegal	Illegal	Illegal	None	Cannabis status is influenced by Islamic law, which renders cannabis consumption a sin (Arnold, 2013).
Seychelles	Illegal	legal	CBD-based products were legalized for medical purposes in 2020.	Cannabis was moved to a class B drug by the 2016 Drug Acts. This later facilitated the legalization of CBD-based products for health purposes (Karapetyan, 2023).
Sierra Leone	Illegal	Illegal	None	Illegal cannabis cultivation is popular enough to disrupt food production.
Somalia	Illegal	Illegal	None	No clear information on the state of cannabis legalization attempts in Somalia.
South Africa	Legal	Legal	Legalized in 2018.	South Africa decriminalized the use of cannabis in a private space.
South Sudan	Illegal	Illegal	None	No clear information on cannabis legalization in South Sudan
Sudan	Illegal	Illegal	None	No clear information on cannabis legalization in Sudan
Tanzania	Illegal	illegal	None	Since 2012, lawmakers have been campaigning to intensify penalties for cannabis possession and use. This will include a life sentence for some offenders (Tanzania, 2019).
Togo	Illegal	Illegal	None	Local farmers say cannabis cultivation is more profitable than other cash crops (DIANE Publishing, 1995).

Tunisia	Illegal	Illegal	None	The government is considering relaxing its drug-related punishments to decongest their prison (Guellali, 2016).
Uganda	Illegal	Illegal	Legalization status was overturned in 2023.	The Court ruled against the law to legalize cannabis and khat, claiming it was passed without the required quorum in parliament (BBC News, 2023).
Zambia	Illegal	Legal	It was legalized for medicinal purposes and exports in December 2019.	Cannabis was legalized for export and medicinal purposes.
Zimbabwe	Illegal	Legal	Legalized cannabis in 2018	Zimbabwe is the second African country to legalize cannabis for medicinal purposes.

The socioeconomic prospects of cannabis legalization in Africa

Serving as the cornerstone of Africa's economy, the agricultural sector sustains millions of individuals residing in rural areas. This sector, when strategically harnessed, holds the potential to bolster food security, alleviate poverty, and propel sustainable development, concurrently providing a vital avenue for youth employment (Jayne et al., 2017). Within this context, the legalization of crops such as cannabis for both utilization and cultivation emerges as a catalyst for heightened economic growth, reduced unemployment, and enhanced sustainable progress within the realm of agriculture. The act of legalizing cannabis engenders employment opportunities spanning processing, distribution, retail, and associated industries, thereby stimulating economic expansion, and fostering foreign investments (Jayne et al., 2017).

Forecasts predict the global legal cannabis market to attain a value of $272 billion by 2028 (Africa Business, 2021). This trend has prompted discussions worldwide regarding the deregulation of cannabis to stimulate foreign direct investment and augment economic diversification.

Remarkably, Africa annually produces over 38,000 tons of cannabis. Despite its status as both the world's leading cannabis producer and consumer, the continent's legal cannabis industry remains in its nascent stages. Fueled by business-friendly legislation and a robust regulatory framework promoting the development of high-quality pharmaceutical products, Africa's cannabis industry has the potential to generate an annual revenue of $7.1 billion by 2023 (Uwakonye, 2020). This emergent industry serves as a linchpin for Africa's economy, fostering job creation, income

generation, agricultural diversification, and foreign investment prospects. As societal perspectives on cannabis evolve, it is increasingly imperative for all African nations to embark on the path of legalizing and/or decriminalizing its utilization, thus enabling the continent to harness the multifaceted versatility inherent in the cannabis plant.

Undeniably, the economic promise that cannabis legalization holds for the people of Africa constitutes a compelling argument in its favor (Owusu et al., 2021). Global patterns have linked poverty to compromised health behaviors, with cannabis addiction disproportionately affecting socially disadvantaged communities. Considering these circumstances, the present juncture presents a propitious moment for African nations to legalize cannabis cultivation. Such a move could unlock the latent economic potential of cannabis liberation while concurrently addressing the issue of youth unemployment (Duvall, 2019).

Navigating challenges confronting cannabis startups in Africa

The establishment of startups within the cannabis sector confronts a myriad of intricate challenges, with distinct prominence in Africa, where the endeavor of business initiation and subsequent legality is marked by complexity. These formidable hurdles encompass an array of obstacles, notably encompassing substantial initial costs, intricate legal and regulatory frameworks, societal perceptions, global constraints, limitations in market development, infrastructural deficiencies, imperatives for capacity enhancement, and considerations for social equity (Anderson et al., 2020).

A notable concern pertains to the steep startup costs intrinsic to cannabis production, a factor that invariably favors large foreign entities. Such expenses for launching a cannabis enterprise within Africa exhibit considerable variability across countries. Illustratively, the licensing fees for production stand at $10,000 and $35,000 in Malawi and Lesotho, respectively. For smaller-scale producers and cultivators, these exorbitant financial obligations render the prospective economic gains virtually unattainable (Sneyd et al., 2022).

Concurrently, Africa possesses the potential to harness the economic opportunities offered by the cannabis industry while concurrently fostering social equity and sustainable growth. This can be achieved through the establishment of lucid and robust legal frameworks, targeted investments in infrastructural development and capacity building, the cultivation of international cooperation, and the promotion of social justice (Kavousi et al., 2022).

Gartner's seminal work in 1985 introduced a conceptual framework for novel venture inception, encompassing four pivotal entrepreneurial perspectives: the traits of the venture's initiators, the structure of the entity formed, the encompassing environment's attributes, and the process steering the startup's commencement. This framework has been further distilled by Anderson et al. (2020), concentrating on analyzing the environmental elements within Gartner's schema that exert influence on cannabis startups. A novel conceptual paradigm, labeled the PESTLE analysis, emerges from this effort. The acronym encapsulates a framework that scrutinizes the Political, Economic, Social, Technological, Legislative, and Environmental factors exercising both direct

and indirect impacts on businesses, specifically within the domain of cannabis startups in the United States (Table 2). While contextual adaptations might arise amongst various countries, this conceptual apparatus holds the potential to serve as a guiding beacon for African nations contemplating the legalization of cannabis cultivation. It is imperative to approach cannabis legalization with prudence, factoring in considerations for public health, education, societal apprehensions, and the concurrent establishment of accountable and ethical industry practices. Through strategic policy formulations and targeted interventions, Africa can empower its youth, effectively translating their potential into tangible opportunities, thereby nurturing a prosperous future (Mokwena, 2019).

Table 2. A PESTLE Analysis for Cannabis Business Setup

Political	• The Control Substance Act (CSA) of 1970 categorizes cannabis as a Schedule I drug. • The enforcement of cannabis criminalization under federal law has varied under different administrations, thus lacking clarity and stability.
Economic	• The cannabis industry was expected to generate $7-9 billion in retail sales in 2018. By 2022 it was projected to reach $22 billion. • The estimated economic impact in 2018 was $26-28 billion reaching $80 billion by 2022. • Estimated employment is over 150,000 full-time workers.
Social	• Little to no brand recognition among consumers. • A negative image of the cannabis culture is portrayed in the media. • Employment in the business might restrict future job opportunities.
Technology	• Computerized plant monitoring. • Robotics (drone automated weeding). • Advanced security measures. • Plant cloning.
Legislative	• Strict employee regulations • Limited safe and legal options to deposit cash. • Licensing.
Environmental	• Concerns with forest fragmentation, landslide, and erosion by cannabis farming. • High water dependency is an issue in drought regions. • High energy usage is a concern. • Cannabis/hemp can serve as carbon sequestrator crop.

CONCLUSION

African continent holds significant potential to emerge as a global leader in the cannabis industry. This potential is underpinned by the region's favorable climatic conditions and nutrient-rich soils,

which can support up to three growth cycles of cannabis per year. Furthermore, Africa's ample landmass is conducive to cannabis cultivation, positioning the continent as a promising contender in global cannabis production and exportation. As a collective, African nations possess the capacity to play a pivotal role in the worldwide cannabis market.

While the full legalization of cannabis for medicinal, recreational, and industrial purposes within African countries offers promising prospects, it also faces challenges. Persistent cultural stigma and a dearth of comprehensive cannabis education programs hinder the realization of socio-economic benefits. These barriers impede the establishment of new businesses and job opportunities for the African population. In the current era, the progression of cannabis legalization across Africa displays variations from one nation to another and to address these challenges, cannabis education initiatives can assume a pivotal role in dismantling obstacles and reshaping cultural perceptions. Also, taking inspiration from the 2018 US Farm Bill, which permits the cultivation of cannabis cultivars containing up to 0.3% of Δ9-THC for non-psychotropic compounds such as CBD and CBG, fiber, feed, and oil production, Africa could adopt a similar approach and pave the way for the generation of an anticipated annual revenue surpassing $7.0 billion.

Conflict of Interest

The authors declare that this review was developed in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions

This comprehensive review was written by AJ, DG, EA, and CA. AJ performed the document edition, validation, and final revision. Additionally, EA, DG, and CA provided a thorough review and discussion of the assigned topics and ensured that the final document reunited the high standards to be a comprehensive review. All authors contributed to the article and approved the submitted version.

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